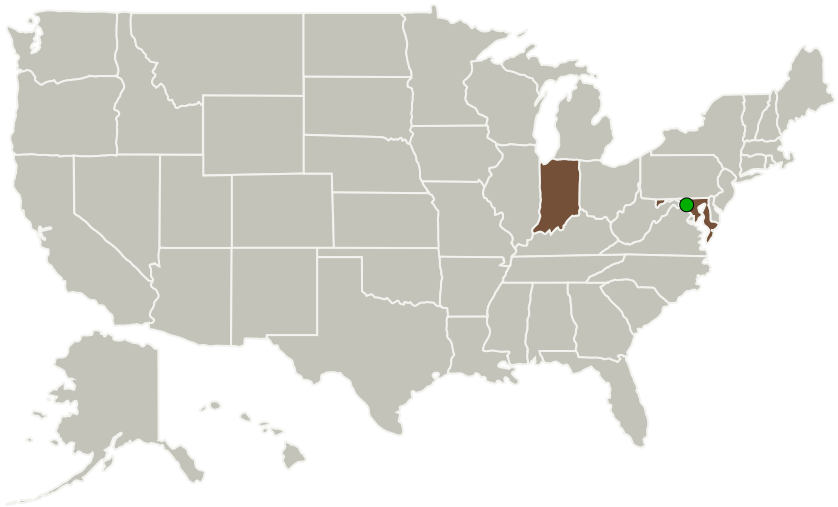
In Situ Metrology for the Corrective Polishing of Replicating Mandrels, Phase I

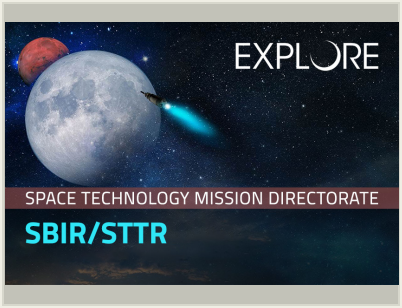
Completed Technology Project (2010 - 2010)

Project Introduction

The International X-Ray observatory (IXO) is due to be launched in 2021. The core of the instrument is a very large (3.2 meter diameter) Wolter I optic, to be assembled from approximately 13,000 individual elements. Each element will, in turn, be created by 'slumping' glass over a precision mandrel, of which there must be in excess of 700. In addition to the very large size of the mandrels (up to 1.6 meter radius), figure and size tolerances are exceedingly tight, ranging from 2 nanometers (axial figure) to 200 nanometers (radius variation). The combination of size, accuracies, production rate requirements and the number of individual component designs defy standard optical metrology techniques. While polishing equipment that can meet these tolerances exists, the polishers must be controlled by continuous or near continuous (process intermittent) feedback. In this effort we propose to develop a unique "point-defined" metrology instrument that can be incorporated into the polishing machine itself, to control the manufacturing process to the required levels of accuracy. In Phase 1 we will develop conceptual designs for both stand-alone and on-machine instrumentation. In Phase 2 we will develop a stand-alone metrology instrument, and in Phase 3 we will fully incorporate the technology onto a commercial polishing instrument.

Primary U.S. Work Locations and Key Partners





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Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Zeeko Technologies, LLC	Lead Organization	Industry	West Lafayette, Indiana
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Indiana	Maryland

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139104)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Zeeko Technologies, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

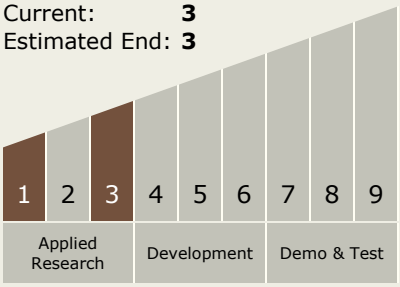
Carlos Torrez

Principal Investigator:

John D Kelchner

Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.1 Optical Communications
    - TX05.1.6 Optimetrics

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System